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The Aeronautical Appropriations

THE government aeronautical estimates for the coming fiscal year, which are given in detail in this issue, afford much food for reflection. The fact that, despite the concerted attempt at reducing the cost of running the government, it should be proposed to spend a slightly larger amount of money on the various air establishments of the nation than last year sufficiently shows the increased importance aeronautics has assumed during the year.

Perhaps the most significant point about these estimates is that whereas it is proposed to spend roughly four million dollars less on the Army Air Service than was appropriated last year, the appropriation requested for Naval Aviation shows an increase of over four and a half million dollars. Thus, for the first time since aviation became a factor in the fighting services of the nation, the air appropriation of the Navy is to exceed that of the Army.

Considering the question impartially, such a change is not to be wondered at. It does not mean that Naval Aviation is necessarily more important to National Defense than the Army Air Service, but rather that the Navy is at the present time much more in need of suitable air equipment, and of experimentation for the development thereof, than the Army.

The Army Air Service possesses for all emergencies several standard types of military airplanes which are thoroughly up to date and which it could place in production instantly. These types—observation, pursuit, and bombardment airplanes—form the mainstay of the Army Air Service for modern warfare. There still remain to be created some more novel types, such as ground attack, night pursuit and night observation airplanes, but these, while important, will constitute but a small percentage of the fighting air fleet, and their use may be considered in a way as accessory. These types are still in the experimental stage, and the Engineering Division of the Air Service is at present engaged in determining their most desirable features.

The Navy, on the other hand, does not possess by any means such an up to date equipment. Its patrol seaplanes date back to the time of the Armistice, and though they are excellent machines, they cannot be considered as being quite up to modern requirements. Its fleet aviation is even less fortunate in that its equipment is still in a state of flux, a large amount of experimenting being yet required to establish anything like standard types for scouting with the fleet, gun spotting, torpedo dropping, etc. The question is further complicated by the difficulties inherent in "deck-flying," for while the Navy catapult affords a satisfactory solution to the problem of taking off from a ship, the return of the airplane onto the deck of a vessel is still far from being solved. Hence it will be seen that the comparatively large air appropriation requested for the Navy is entirely justified.

That the appropriation for the Air Mail Service should show an increase of one million dollars over that of the current fiscal year is highly gratifying, for this service which is making an excellent showing in the face of great natural difficulties deserves to be equipped with more efficient airplanes than those which it now employs.

While the civil air appropriation seems small in comparison with other countries, it should be noted that the government intends to ask for a special appropriation should the bill providing for a Bureau of Civil Aeronautics, which is backed by the Administration, be passed by Congress.

The Paris Aero Show

THE Paris Aero Show, which is reviewed in part in this issue, indicates some interesting trends due to the large development of French commercial aviation. Probably the most remarkable of these is the trend toward large multi-engined passenger carriers.

As the construction work of French aircraft manufacturers is largely influenced by the policy of the French air department, since "approved machines" draw a subsidy equal to one half their price when they are operated on an air transport service, these tendencies are worth noting. The appearance of large passenger carriers is probably due to the belief that aerial traffic will undergo a material increase next year, and also to the fact that for next spring several civil air services are projected which will greatly exceed in length anything that has hitherto been attempted in Europe. One such line is to run from Paris to Constantinople, while the France to Morocco line will be nearly trebled in length by extending it to Dakar, in French West Africa. A seaplane service between France and Algeria, that is, straight across the Mediterranean Sea—a distance of about 500 miles—is also under consideration.

Now, while a longer airway does not necessarily mean a larger number of passengers, the accommodations for such a route must be more complete than can be achieved on single-engined airplanes. People who consent to travel, even with intermediate stops, twelve hours by air, will expect a certain amount of comfort which a mere "limousine body" does not afford.

Another reason for which the French department encourages the creation of multi-engined airplanes is undoubtedly due to its desire to afford the aerial traveler a larger insurance against irregular services. This is most likely the reason why most of these machines are fitted with three or four engines, while twin-engined airplanes are hardly represented. It is evident that while a twin-engined airplane is most unlikely to complete a journey on one engine, a three-engined machine would have a pretty good chance of doing so on two engines, and a four-engined airplane have an even better chance of reaching its destination on three engines. This point is worth serious consideration by all those who are engaged in the study of commercial air services.

Government to Spend $35,600,000 on Aviation

The annual estimates of Government aeronautical expenditures for the fiscal year beginning July 1 next and ending June 30, 1923, just submitted to Congress by President Harding, provide for the appropriation at $35,600,000 This compares with $35,113,431 appropriated for aviation during the current fiscal year.

The sum is distributed among the aviation bureaus of the Army and the Navy and to the Air Mail Service of the Post Office Department. The estimates do not provide for an appropriation for the proposed Bureau of Aeronautics of the Department of Commerce, which has received the approval of President Harding and which will be asked of Congress. This appropriation will be made when the proposed bureau is established

The Bureau of Aeronautics of the Navy Department gets the bulk of the total appropriation requested, this sum being $17,000,000 for the coming fiscal year, as compared with $13,413,431 provided for the current year The Air Service of the United States Army is allowed $15,000,000 in the budget estimates, as compared with $19,200,000 for the current year In addition to the $15,000,000, as was done last year, $1,250,000 is allowed for increased aviation pay, $1,000,000 for officers and $250,000 for enlisted men.

An increase of almost $1,000,000 is provided for the Air Mail Service of the Post Office Department, to be maintained between New York City and San Francisco, by way of Chicago and Omaha The estimates for appropriations for the next fiscal year are $2,200,000 as compared with $1,250,000 for the current year In addition to this it is proposed that an additional $150,000 be spent in transporting mails by airplane to foreign countries.

The money provided for the Army Air Service is less than half as much as was expended during the Government fiscal year ended June 30 last, which was $33,053,762.65 Here is a tabulation, of the money available for the Army flying organization, showing the estimates for appropriations for the fiscal year 1923 and the estimates of expenditures for the current fiscal year, or that ended with June 1922

OBJECT OF EXPENDITURE	ESTIMATED 1923	ESTIMATED 1922
Personal services other than experimental and research		
Salaries	$ 787 782	$ 1,040 000
Wages	2,328 948	2,289,000
Personal services, experimental and research		
Salaries	578 800	578 000
Wages	1,483 200	1,483 200
Normal operating expenses	6 310 270	6 665 000
Claims for damages	4 000	4,000
Procurement, installation and improvement of gas plants, hangars, repair shops and other ground equipment	325,000	651 000
Purchase and construction of new aircraft and their equipment	5 000,000	8,000 000
Helium experimentation; conservation and production of helium	250,000	250 000
Experimental and research including pay and expenses of civilian employes	4,000 000	4 500 000
	$17 060,000	$21 280 000
Deduct for expenditures duplicated in above statement under "personal services and other items	2 060 000	2 080 000
	$15 000 000	$19 200 000

Provision for the extension of aviation facilities throughout the United States is contained in an item of the proposed bill, to authorize the Secretary of War that "whenever a municipality, civic organization, individual or corporation donates a suitable tract of land, either in fee-simple or by lease-hold interest, to accept such donation when in his judgment the interests of the national defense will be promoted thereby, and to establish, maintain and operate thereon under such rules as he may promulgate, facilities for flying, including shops, hangars, gas plants and other installations as may be necessary for the national defense"

Here is a detailed table showing the money asked for the Bureau of Aeronautics of the Navy Department:

OBJECT OF EXPENDITURE	ESTIMATED 1923	ESTIMATED 1922
1—For personal services, for clerical, inspection drafting and messenger forces, except inspection forces for construction at stations under the cognizance of the Bureau of Yards and Docks (1)	$ 700 000	(2) $ 275,000
2—For expenses incident to personal services for aviation clothing for lodging clothing, subsistence for expenses incident to flights in aircraft, and payments in settlement of expenses in connection with the safekeeping parking and shipping of aircraft landed away from ship or station, for incidental expenses for ships, stations, inspectors offices such as photographing, technical books and periodicals, stationery supplies and instruments (2)	50 000	
3—For constructing incident to flying stowing releasing or securing aircraft (3)	475 000	
4—For continuing experiments and development work on all types of aircraft	1,210 050	1 815 000
5—For new construction and procurement of aircraft and equipment (power plant and hull)	6 881 450	5 823 000
6—For aircraft and accessories in course of construction or manufacture on June 30, 1922	250 000	445 000
7—For aviation equipment navigational, photographic aerological, radio misc	568 300	
8—For maintenance and operation of air stations, fleet activities aircraft factory, helium plant testing laboratories, spares, engines and hulls flying overhauling and repairing of aircraft and their engines	6 815 100	4 534 181
9—For new construction at stations and aviation facilities, including the pay of inspection forces for this purpose under the cognizance of the Bureau of Yards and Docks	500 000	1 177 000
TOTAL	$17 000,000	$13 413 431

(1)—Increase for 1923 due to the formation of the Bureau of Aeronautics and the transfer to this bureau of employes.
(2)—Included in subhead (7) ($50 000)
(3)—Included in subhead (5) ($301,000)
(4)—Included in subhead (5) ($150 000)
(5)—Included in subheads 5 and 6, $48 250 plus about $500,000

British Air Transport Expansion

A recent article in the London *Times* states that four airplane transport schemes have now been officially approved under the revised scale of subsidies which the Air Ministry is to shortly introduce on the termination of the present temporary arrangement

Two of the schemes entail the continuance between London and Paris of the existing Instone and Handley-Page services, the third—a new London to Paris express service—is to be conducted with de Haviland monoplanes by an organization which will have at its head Col. Frank Searles, who was Managing Director of the late Airco line during its progressive phase of operation in the summer of 1920 His operation of the new de Haviland machines, which carry a pilot and 10 passengers at more than 100 m p h with the power of one 450 hp Napier Lion motor, is awaited with much interest. The fourth British air service, which is said to have obtained approval, is one for a daily service between London and Brussels. At present a service is operated on this route by the Belgian state-aided S N E T A..

The hope is entertained that by next Spring there will be a British service flying between London and Amsterdam, a route very important because of the Northern Europe connections which it opens up. At present it is monopolized by the state assisted Dutch Royal Air line, which has had a most encouraging season and is well supported by its government in its plans for next year

Flying in fog is the greatest handicap to keeping a regular schedule, but this has been partially overcome by radio piloting If they can see the ground from 200 ft., planes can be brought in safely in a fog Experiments are now being continued and they have had at least one plane approach in a fog and have informed the pilot by radio when to cut off his engine and come down The landing in this case was successfully made, but there is still much to do in experimental work in this line.

The Seventh Paris Aero Show

The seventh exposition of aerial navigation held at the Grand Palais in Paris during the last two weeks of November was, as befitted the leading position France has achieved in commercial aviation, chiefly devoted to civil air transport. Commercial machines of all types and sizes predominated, and the large number of multi-engined passenger carriers was a feature of the show Blériot, Bréguet, Caudron, Ernoul, Latécoère, and Potez each exhibited cabin machines driven by several engines, while Farman had on exhibit two bombers, one four engined and one twin engined, and Besson showed a four-engined cabin flying boat.

Single engined airplanes of French manufacture were shown by Blériot, Bréguet, Caudron, Farman, Hanriot, Levasseur, Latécoère, Loiré & Olivier, Morane-Saulnier, Nieuport-Delage, Potez, Sanchez-Besa, S.E.C.M., and Tampier Foreign aircraft industries were represented by Ansaldo, Fokker and Ricci The only amphibian at the show was exhibited by the F B A company

Perhaps the most noticeable engineering feature of the show was the extensive use of metal construction, Bréguet, Ernoul, Farman, Hanriot, Latécoère, Liore & Olivier, and Potez exhibiting airplanes either entirely or partly built of metal Another noteworthy point about this show was the total absence of freakish designs, a thing which could not be said about previous exhibitions.

The most unusual exhibit was the Pateras-Pescara helicopter, around which much interest centered owing to the fact that this machine had left the ground a few weeks previously in Barcelona, Spain

Following is a brief description of the aircraft exhibited

Ansaldo

This well known Italian firm exhibited an Ansaldo A300T cabin machine fitted with the 300 hp Fiat engine. This type is similar in appearance to the A300C, but carries six passengers beside the pilot.

Ateliers des Mureaux

This new French aircraft firm showed on its stand a Vickers-Vimy Commercial fitted with two 450 hp Napier "Lion" engines Except for the larger horsepower this machine is practically identical with the passenger carrier which appeared in 1919, and which in its turn was an adaptation of the Vickers-Vimy bomber produced in 1918

Bleriot Aeronautique

The machine which attracted the greatest attention on this stand, and perhaps in the whole Salon, was the Spad 45 four engined cabin airplane. This machine which, like all Spads, is the product of André Herbemont's genius, accommodates seventeen passengers and a crew of three, and is driven by four 275 hp navy type Hispano-Suiza engines. The engines are mounted in two pairs on the lower wings, and drive tandem propellers.

As may be seen from Fig 1, the entire machine is streamlined down to the last inch, which gives it a very pleasing appearance, while at the same time it must reduce parasite resistance to the lowest possible limit This constant care which M Herbemont takes in "easing off" the air flow is not only apparent in the lines of the fuselage and of the engine nacelles, but also in the minimum of strut work occurring between the wings The manner in which the wings are attached to the fuselage and connected between themselves by single streamlined I struts and similar cabane struts, affords a lesson which many a designer might ponder over with advantage Not less interesting is the mounting of streamlined fuel tanks on the upper wings where they are least exposed to injury in a rough landing This practice which M. Herbemont originated on the Spad 33 six-seater cabin machine has well proven its worth during half a year of operation on the Paris—London and Paris—Warsaw air lines.

Unlike many of the large multi-engined machines exhibited, the Spad 45 is of wood construction, the use of metal being limited to fittings, streamlined wires and other minor elements The fuselage is built of three-ply in the well known Spad manner, and is of circular section. The nose of the machine contains a navigation cockpit equipped with a radio apparatus, aft of which is situated the control cockpit which accommodates two pilots, and which is fitted with dual controls. The range of vision from the control cockpit is of course entirely unobstructed, which should be of great help in piloting.

FIG. 1. BLERIOT SPAD 45 PASSENGER CARRIER. FIG 2. BREGUET 19A2 TWO-SEATER FIGHTER. FIG 3 BESSON H6 TWO-SEATER FLYING BOAT
Photo Underwood & Underwood

Aft of the control cockpit, and exactly between the circles of rotation of the tractors and pushers, is situated the passenger cabin which seats fifteen persons. To accommodate such a large number within the set limit of fore and aft length the seats have been disposed three abreast, whereby variable passenger loads will have less influence on the behavior of the machine. A passage way runs on one side of the seats through the cabin, and leads forward to the control and navigation cockpits, while aft it opens into a cockpit seating two persons. The latter provision has been made to accommodate passengers who prefer flying in the open air, the experience of the air lines showing that there exists a distinct demand for such a provision. A washroom is also fitted aft.

The wings have the characteristic form of the post war Spads, in that the upper wings are swept back and staggered forward over the lower wings, which have straight edges in the plan. This arrangement, beside affording some aerodynamic advantages, is particularly favorable from the viewpoint of vision. The construction of the wings follows straight spar and rib practice.

The landing gear consists of four wheels carried by a sangia axle on V shaped struts which appear to such an extent the symmetrical opposites of the cabane struts that they almost seem interchangeable. The arrangement of the landing gear is strongly reminiscent of that found on the Curtiss Eagle, including the streamlined housing which covers the wheels.

The tail unit does not call for special comment except that the tail plane incorporates a variable incidence gear which is controlled by the pilot from the cockpit.

The engine nacelles can rapidly be removed from the wings by unscrewing a few nuts.

The Spad 45 has been developed to satisfy the requirements of the French civil air department for a passenger carrier to be used on subsidized air lines. The machine is to be operated next spring by the Franco-Roumanian air line between Paris and Constantinople.

Other Blériot exhibits included the Spad 48 six-seater cabin machine, which is identical with the Spad 33 except that it has a 275 hp. Lorraine-Dietrich engine, and the Spad 34 two-seater school machine, which is fitted with an 80 hp. Le Rhône.

Louis Breguet

This veteran aeronautical firm, which has specialized in all metal construction since 1910, exhibited the fuselage of the Leviathen 21, a large commercial passenger carrier with a central engine room. The power plant consists of four 225 hp. Bréguet-Bugatti eight cylinder vertical engines, which drive through an automatic connector-disconnector gear a single tractor propeller. This gear was described in detail in AVIATION AND AIRCRAFT JOURNAL a year and a half ago. The trials of this motor group have proceeded for twenty months, and they are believed to have been successfully terminated, hence the appearance of the complete machine may be expected before long. The entire machine is built of duralumin. Some of its constructional features are shown in the accompanying line drawings (A).

Another interesting Bréguet exhibit was the Type 19A2 two-seater fighter fitted with a 450 hp. "two-unit" Bréguet-Bugatti power plant. This machine is shown in Fig. 2 with the wing framing partly uncovered. With the exception of the wings and of the portion of the fuselage aft of the tourelle, which are fabric covered, the machine is covered with sheet duralumin. Here again the good streamline of the fuselage is noticeable, and only one interplane strut of a forked I section, occurs on either side of the fuselage. The following characteristics are available: wing area 485 sq. ft., weight empty 2540 lb., weight loaded 4200 lb. The machine has not yet been tested, but its designed performance is a maximum speed of 142 m.p.h., a speed of 120 m.p.h. at 23,000 ft., and a ceiling of 26,400 ft.

On the same stand a Bréguet 14T cabin machine, the type so successfully used on the Paris—London route, was shown fitted with floats, while another machine of this type was exhibited equipped as an ambulance.

Marcel Besson

The firm of Marcel Besson is at present probably the largest French enterprise exclusively engaged in seaplane construction. Its exhibit comprised a model H6 two-seater triplane flying boat and the hull of a four-engined ocean going flying boat which is to accommodate twenty passengers.

The model H6 (Fig. 3) is chiefly remarkable for the form of its wings which decrease in span and in chord from the bottom upward, and for the fact that it is a tractor. Although the Besson H6 has not the slightest resemblance with the Dornier tractor flying boat, the successful operation of the latter on the Swiss lakes had perhaps something to do with the creation of such a type in France. And here it may be remarked that although a tractor flying boat will seem to the majority of our readers a great novelty, the idea is far from new, the Glenn H. Curtiss built in 1913 the Herold F. McCormick a tractor biplane flying boat which flew quite well, although the design was not further developed. This modern reversal to a fairly old idea is rather significant, and M. Besson attributes it to the desire of having a seaplane which would perform more nearly like a land machine as such a ship would be ideal for training purposes. Land pilots could also fly it without requiring much special training.

The interplane truss of the Besson H6 consists of wide I struts which form in front elevation an M, in the middle of which is mounted the streamlined engine nacelle. Four streamlined struts brace the nacelle against the hull. The engine is a 130 hp. Clerget rotary, and the fuel and oil tanks are mounted behind the engine in the nacelle.

Ailerons are fitted to the lower wings only. The wings and the power plant are mounted on a hull of clean lines, built to approved boat practice with three-ply mahogany.

The wing area is 320 sq. ft., and the wing loading is about 15 lb./sq. ft. The high speed is 80 m.p.h.

The hull of the Besson commercial high-sea flying boat has been built to satisfy in the first place the requirements of seaworthiness, as it is intended for service in the Mediterranean Sea. For this reason the hull is of very strong construction, the planking being of four-ply mahogany which is riveted to stringers and ribs. Although its form has been chosen with the particular view of riding heavy seas without difficulty, special care has also been taken to insure a quick take-off.

It is interesting to note that the control cockpit and the cabin form a structurally distinct superstructure. To facilitate replacement of spare parts, the superstructure is secured to the hull by a number of bolts passing through short steel legs. Dual control is fitted, together with a variable incidence gear operating the tail plane. The elevator is balanced along its full span by pivoting it aft of its entering edge, for which reason it is structurally separate from the tail plane.

The wings of the Besson sea-going flying boat are of the quadraplane form illustrated in the accompanying line drawings. Here again considerations of seaworthiness have been predominant. It was realised that a minimum span was in addition to, outside of a stout hull, the principal requirement, and this meant either tandem wings or a quadruplane form. M. Besson preferred the latter solution as having better aerodynamic properties, not only on account of the absence of interference, but also because it simplified the questions of stability. By staggering the wings as illustrated it has been possible to keep the span of the wings within 95 ft. although the wing area attains 2700 sq.ft. To illustrate the case with an American example, the Besson sea-going flying boat has a smaller span then our F5L's (95 ft. as against 102 ft.) although its wing area is considerably larger than that of our NC's (2,700 sq.ft. as against 2360 sq.ft.) The wings of the front biplane have a chord of 6 ft. 7in. while the rear wings have a chord of 7 ft. 3 in.

The power plant consists of four 370 hp. Lorraine-Dietrich engines which are mounted in tandem on the middle wings and drive tandem propellers. The designed high speed is 105 m.p.h., and with twenty passengers on board the fuel tanks will be sufficient for a four hour flight.

Rene Caudron

René Caudron, who built the first twin engined airplane which was used by the French air service in the recent war, exhibited a three-engined passenger carrier and a single-engined tractor biplane.

The three-engined machine, model C61, represents an attempt to eliminate forced landings due to engine failure in airplanes of medium passenger carrying capacity, such as are generally fitted with a single engine. Whether the mechanical complication and the added head resistance such an arrangement entails is worth while remains to be found ont through actual operation.

The C61, which is shown in Fig. 4, carries six passengers in a closed cabin, and a crew of two in a control cockpit situated in front of the wings. The power plant is composed of three 140 hp. Hispano-Suiza engines driving tractors, which are mounted one in the nose of the machine, and one each ontboard. In the case of the latter no special effort seems to have been made toward streamlining, as no wing nacelles are fitted, although in other respects the C61 is fairly well streamlined and represents an undoubted advance on previous Caudron practice.

Generally speaking this machine does not embody any particularly novel features, although the landing gear differs from standard practice in that it has fixed wheel underneath the nose of the machine, evidently to protect the central tractor against possible injury in a rough landing. The landing gear proper consists of two twin wheels with a skid in between.

The principal characteristics of the C61 are: span 80 ft. 3 in., overall length 46 ft. 3 in., maximum height 12 ft. 10 in., wing area 1123 sq. ft., weight empty 4620 lb., weight loaded 7480 lb. The fuel supply is sufficient for a 400-mile flight at 80 m.p.h.

The single engined machine exhibited by Caudron is the model C60. This is an open cockpit tractor biplane fitted with a 130 hp. Clerget rotary engine, and it seats two persons side by side, with dual control if desired. This type is used for training in the Caudron school, but it has also been used with success in extended cross country flights. Pilot Poirée made with this machine, last August, a circuit flight of 1860 miles around France in competition for the Michelin Cup.

The characteristics of the C60 are as follows: span 33 ft. 4 in. (upper wings), 31 ft. 4 in. (lower wings) overall length 24 ft. 7 in., maximum height 8 ft. 7 in., wing area 270 sq. ft., weight empty 1110 lb., weight loaded 1900 lb.

Ernoul

This firm, which is a newcomer in aircraft construction, although it possesses considerable practical experience from the operation of the Bordeaux-Toulouse-Montpellier air line, exhibited a twin-engined cabin monoplane of all metal construction which is intended for the new Toulouse-Marseille air line. The machine was designed by M. Dewantiee, chief engineer of Aéro-Transports Ernoul, and is known as FATMA 2.

The FATMA 2 (Fig. 7) has cantilever wings of decreasing thickness and chord, their form in plan being trapezoidal. No external bracing occurs either on the wings or on the tail unit. The power plant is composed of two 260 hp. Salmson engines which are carried in egg shaped nacelles on either side of the fuselage and drive tractors. The cabin accommodates eight passengers, and is particularly spacious and comfortable. A washroom is also provided.

The characteristics of the FATMA 2 are as follows: span 72 ft. 7 in., overall length 42 ft. 10 in., wing area 702 sq. ft., weight empty 3586 lb., weight loaded 6578 lb., pay load 1870 lb.

H. & F. Farman

The exhibit of the Farman brothers included a four-engined night bomber, a twin engined bomber derived from the "Goliath," a torpedo carrier, a metal two-seater observation machine, and a Farman "Sport."

The four-engined night bomber is unmistakably built on Goliath lines with the chief exception that the power plant, consisting of four 370 hp. Lorraine-Dietrich engines, is disposed in twin units, and drives two sets of tandem propellers. The landing gear is very elaborate, and is composed of three sets of twin wheels, two of which occur under the engines while the third pair is mounted under the nose. In view of the fact that this machine weighs 22,550 lb. fully loaded, such a precaution is understandable.

The wings are of biplane form, and so are the tail planes, while three rudders are fitted between the upper and lower tail planes. Ailerons are fitted to both upper and lower wings. The wings are equipped with a folding arrangement.

Following are the characteristics of the Farman four-engined night bomber: span 113 ft. 9 in., overall length 72 ft. 7 in., maximum height 24 ft. 9 in., wing area 3240 sq. ft., weight empty 11,660 lb., weight loaded 22,550 lb., high speed 100 m.p.h., theoretical ceiling 15,000 ft.

The Farman twin engined bomber is practically identical with the Goliath 12-passenger airplane, save for the suppression of the cabin, and the consequent decrease in height of the fuselage, on which gun turrets are mounted.

The Farman torpedo-carrier is a two-seater tractor biplane fitted with a 450 hp. Renault engine. It has a certain family resemblance with the Goliath, a trait which is always very no-

FIG. 4. CAUDRON C61 PASSENGER CARRIER. FIG. 5. NIEUPORT 30T2 PASSENGER CARRIER. FIG. 6. TAMPIER SPORT AIRPLANE.
Photos International and Wide World

CHARACTERISTICS OF NEW AIRCRAFT EXHIBITED AT THE SEVENTH PARIS AERO SHOW

Make	Type No	Engines	Total hp.	Pay Seats	Crew	Speed m.p.h.	Range hr	Ceiling ft.	Weight empty lb.	Weight loaded lb.	Wing area sq. ft.	Span ft.	Length ft.	Height ft.
Ansaldo	A300/?	1 Fiat	300	6	1									
Besson	1 5	4 Lorr	1480	20	5	83	6	11,530	8,600	17,600	2,786	95'8"	75'10"	21' 2"
	H6	1 Clerget	130	1	1	133	4	13,200		1,760	280	29'8"	66' 9"	10' 4"
Bleriot	834	1 Rhone	80	1	1	80	8½	13,200	1,056	1,600	220	26'3"	21' 2"	7' 7"
	845	4 Hispano	1100	17	3	120	5	13,900	7,700	15,400	1,500	70'8"	51'10"	18'10"
	348	1 Lorraine	275	5	1	108	5	18,200	2,430	4,400	455	38'4"	28' 8"	10' 5"
Breguet	16A2	1 Bugatti	450	(1)	2	143	4	26,400	2,540	4,280	485	48'8"	30' 2"	10'10"
	14T2	1 Renault	300	4	1	106	4½	16,300	2,446	4,646	550	48'5"	29' 8"	10'10"
Caudron	C60	1 Clerget	130	1	1	100	5	[illegible]	1,11?	1,900	281	33'7"	24' 8"	8' 8"
	C61	2 Hispano	420	8	3	96	5	13,200	4,826	7,480	1,128	60'8"	46' 3"	12'10"
Ernoul	2	2 Salmson	600	8	2	120	5	26,000	3,388	6,580	702	72'7"	42' 3"	14' 5"
Farman	BN4	4 Lorraine	1480	(2)	4	100	5	15,000	11,880	22,556	2,240	113'10"	72' 7"	24' 0"
	A2	1 Salmson	260	(3)	2	118	4	21,780	1,970	3,190	400	39'7"	26' 8"	10' 3"
F.B.A.	M1	1 Darracq	420			93			4,400	6,846	810	58'8"	41' 7"	12'10"
Hanriot	HD12	1 Renault	300	2	1	106	4	18,000	3,800	5,448	472	42'2"	31' 4"	
	HD22	1 Hispano	305	(4)	1	215	1	15,000	1,780	2,086	81	21' "	15' 0"	?'10"
Latécoère	LAT?	2 Salmson	750	20	3	123	5½					51'2"	47'10"	
	LAT6	4 Salmson	1000	(5)	6	142	4							
	LAT8	1 Renault	300	5	1	110	8				548			
Levasseur		1 Hispano	180	2	1	115	3	15,000	1,210	2,080	281	51'4"	10' 0"	6'10"
Lioré & Olivier	LeO 7	2 Hispano	600	(6)	3	125	3	23,000	1,920	6,600	780	71'8"	66' 8"	12' 3"
	LeO 9	1 Hispano	300	( )	1	118		23,000		2,555	184	60' "	21' "	6'10"
Morane	AR	1 Rhone	80	1	1	63	3	20,000	660	1,580	245	34'7"	21' 2"	11' 3"
	AU	1 Rhone	120	(8)	1	138	3	14,000	848	1,254	143	29'4"	19' 2"	8' 7"
Nieuport	29C1	1 Hispano	300	(7)	1	144	1½	26,030	1,674	3,430	268	66' "	21' 5"	
	30T2	1 Darracq	420	7	2	114	4	16,400	4,020	8,750	670	58'8"	35'7"	
	Sesq	1 Hispano	300	(4)	1		1¾		1,628	2,166	218	26'5"	20' 2"	6' 7"
Potez	IX	1 Lorraine	370	4	1	125	4	21,500	2,750	4,510	488	46'2"	31' 4"	10' 7"
	X	2 Hispano	540	10	2	135	5½	31,500	4,850	7,700	1,013	60'8"	42' 9"	12' 8"
	XV	1 Lorraine	370	(7)	2	163	4	21,500	2,431	2,860	478	38'7"	27' 8"	7' 7"
Riout	R6	1 Anzani	46		1	91	3		880	570	119	11'4"	12' 4"	
	R5	1 Rhone	60	1	1	85	3		44?	762	140	14'10"	16' 8"	
[illegible] B		1 A.B.C.	40	1	1				440		165	14'9"	16' 8"	10' 8"
S.E.C.M.	3?	1 Rhone	110	1	1	115	4	13,200			227	21'4"	21' 5"	9'10"
Wibault	BN2	1 Renault	500	(11)	2	12?	4	16,500	4,020	6,405		65'0"	41'10"	10' 8"

(1) Day bombardment airplane French air service
(2) Night bombardment airplane
(3) Observation airplane French air service
(4) Racing airplane built for the Deutsch Cup
(5) Bombardment protection airplane
(6) Combat airplane French air service
(7) Low altitude pursuit airplane French air service
(8) Experimental airplane for free flight tests of thick aerofoils
(9) High altitude pursuit airplane French air service
(10) Night observation and pursuit airplane
(11) Night bombardment airplane

Note We are indebted for the above data to our French contemporaries *L'Aéronautique* and *L'Air* Where conflicting data occur in the originals those given by *L'Aéronautique* have been used. Performance is in every case with full load, and with regard to speed at ground level

ticable on Farman products, outside of which it is a tractor of straightforward design. The most notable point about this machine is that it is not equipped with emergency flotation bags as may be expected in view of its naval use, instead the fuselage forms a water-tight hull which is divided into water-tight compartments. The intention is evidently that the machine, once its mission is fulfilled, should land on the water and be hoisted on board its carrier

The characteristics available are as follows span 50 ft. 7 in., overall length 42 ft 10 in., wing area 1076 sq ft., weight loaded 7040 lb

The Farman military two-seater, model A2, fitted with a 260 hp Salmson engine, is perhaps chiefly remarkable for its representing the first metal construction produced by the Farman brothers. This in itself is sufficiently significant in view of the fact that these constructors have up to now consistently opposed such a practice

While no details of the construction are available, it appears from a photograph that the Farman A2 is of metal construction throughout with the exception of the wing and fuselage covering The machine is so constructed that it can quickly be converted from two-seater fighter into a corps observation or a photography machine This type is now in production for the French air service

The characteristics are as follows span 39 ft 7 in., wing area 400 sq ft., weight empty 1969 lb., weight loaded 3190 lb In the tests made by the engineering division of the French air service the safety factor was found to be 8, and the following performance was established high speed at ground level 118 m.p.h., and at 16,500 ft 108 m.p.h., ceiling 20,780 ft., climb 6600 ft. in 7 min. 30 sec., 10,000 ft in 12 min. 35 sec., 16,500 ft in 28 min 25 sec

The Farman "Sport" machine, which was also exhibited fitted with a 45 hp Anzani engine, is too well known to our readers to require any comment.

(To be continued)

Scale and Slip Stream Effects on a 1/24th Size Model of a JN4H

By D L. Bacon

N.A.C.A Report No. 122

This work was undertaken at the Langley Field Aerodynamic Laboratory of the National Advisory Committee for Aeronautics to obtain results on a small model of a complete airplane which might be used for comparison with corresponding tests made in full flight Somewhat similar tests have been previously made at various other laboratories, but as certain discrepancies exist between corresponding tests in different tunnels, it has been deemed advisable to obtain a direct comparison for this particular installation

The present work covers tests on a 1/24th scale model at speeds varying from 6.7 m./sec (15 m.p.h.) to 40.2 m./sec. (90 m.p.h.) A slip stream correction has been obtained by the use of a small belt driven propeller mounted in front of the model, and force coefficients thus obtained are compared with the measurements of the same forces made in full flight on a geometrically similar airplane

This report gives lift, drag, and longitudinal moment values obtained in tests of a particularly accurate model over a wide range of speeds A measure of the slip stream corrections on lift and drag forces was obtained by the use of a power-driven model propeller

Measurements were also made of forces and longitudinal moments for all angles from 0 deg. to 360 deg.

A copy of Report No 122 may be obtained upon request from the National Advisory Committee for Aeronautics, Washington, D. C.

A Good Example for Others to Follow

Evincing their interest in aeronautics, the Peerless Manufacturing Co of Norristown, Pa., made an official request for information on the markings for Norristown, stating that they will be only too glad to place these markings on the roofs of their buildings.

President Harding Urges Civil Air Bureau

The establishment of a bureau for the regulation and development of air navigation under the Department of Commerce is urged by President Harding in a special message delivered to Congress on Dec 8 with the annual report of the National Advisory Committee for Aeronautics.

In his letter, the President states that "there can be no doubt that the development of aviation will become of great importance for purposes of commerce, as well as for national defense." "While the material progress in aircraft has been remarkable, the use has not as yet been extensively developed in America," he says; explaining that this has been due, in the main, to lack of "wise and necessary legislation" "Aviation is destined to make great strides," he writes to Congress, "and I believe that America, its birthplace, can and should be foremost in its development"

The most urgent need for the successful development of aviation, either for military or civil purposes, is the enactment of legislation providing for the federal regulation of air navigation, and the establishment of airways and airdromes under governmental regulation, according to a summary of the recommendations of the National Advisory Committee endorsed by President Harding The licensing of pilots, aircraft and flying fields should be under Government control, the report states If the Federal Government will establish and regulate transcontinental airways, the committee feels confident that air lines for the transportation of passengers and freight will be undertaken rapidly by private enterprise throughout the country The committee points out however that the pioneer national aerial routes should be carefully planned to serve both commercial and military needs In this connection the establishment of a Bureau of Air Navigation in the Department of Commerce is recommended

Summary of N. A. C. A. Recommendations

The general recommendations of the National Advisory Committee for Aeronautics as contained in its seventh annual report to the Congress are summarized as follows.

Legislation for the Development of Aviation. The most urgent need for the successful development of aviation at the present time, either for military or civil purposes, is the enactment of legislation providing for the Federal regulation of air navigation, and the establishment of airways and airdromes under Federal regulation The Federal regulation should include the licensing of aviators, aircraft, and airdromes, the airways should consist of chains of landing fields providing supply and repair facilities and including the necessary meteorological stations, observations and reports If the Federal Government will establish and regulate transcontinental airways as recommended, the committee is confident that air lines for the transportation of passengers or goods will be rapidly established by private enterprise in all parts of the country The first national airways, however, should be carefully planned to serve military as well as civil needs. The committee reiterates its former recommendations as to the manner of accomplishing the desired results, and urgently recommends the establishment by law of a Bureau of Air Navigation in the Department of Commerce

Extension of Aerological Service The committee emphasizes the importance of extending aerological service under the Weather Bureau along airways as established, and recommends that adequate provision of law be made for this service which is so indispensable to the success and safety of air navigation.

Policy to Sustain the Industry. Whatever may have been the faults or the shortcomings of the aircraft industry during or since the war, the fact remains that there must be an aircraft industry, and that it should be kept in such a condition as to be able to expand promptly and properly to meet increased demand in case of emergency The Government, as the principal consumer, is directly concerned in the matter, and should formulate a policy which would be effective to sustain and stabilize the aeronautical industry and encourage the development of new and improved types of aircraft. In this respect the committee invites attention to the recommendation contained in its special report submitted to the President on April 9, 1921, published as House Document 17, and again recommends the adoption of a policy which, while safeguarding the interests of the Government, will tend to sustain and stabilize the industry.

Importance of Military Aviation. Aviation is indispensable to the Army and to the Navy in warfare, and its relative importance will continue to increase. Other branches of the military services are comparatively well developed, whereas aviation is still in the early stages of its development. The demand for greatly reduced expenditures in the military and naval services should not apply to the air services. The committee recommends that liberal provision be made for the Army and the Navy Air Services, not only that provision be made for the maintenance and training of personnel, but also that the funds be adequate to insure the fullest development of aviation for military and naval purposes.

Scientific Research. Substantial progress in aeronautical development, whether for military or commercial purposes, must be based upon the application to the problems of flight of scientific principles and the result of research The exact prescribed function of the National Advisory Committee for Aeronautics is the prosecution and coordination of scientific research, and, while encouragement may be taken from the progress made, greater provision for the continuous prosecution of researches on a larger scale is strongly recommended by the committee.

The Air Mail Service The Air Mail Service has demonstrated that airplanes can be utilized with certain advantages in carrying the mails. And it has done more than this, despite the handicap of using military types of aircraft, poorly adapted to its work or to any civil or commercial purpose, in demonstrating that commercial aviation for the transportation of passengers or goods is feasible There are several causes which are delaying the development of civil aviation, such as the lack of airways, landing fields, aerological service, and aircraft properly designed for commercial uses. The Air Mail Service stands out as a pioneer agency, overcoming these handicaps and blazing the way, so to speak, for the practical development of commercial aviation. As a permanent proposition, however, the Post Office Department, as its functions are now conceived, should no more operate directly a special air mail service than it should operate a special railroad mail service; but until such time as the necessary aids to commercial aviation have been established it will be next to impossible for any private corporation to operate under contract an air mail service in competition with the railroads The National Advisory Committee for Aeronautics therefore recommends that provision be made for the continuation of the Air Mail Service under the Post Office Department.

Helium and Airships The United States has a virtual monopoly of the known sources of supply of helium, and these are limited Experiments have been conducted by the Bureau of Mines with a view to the development of methods of production and storage, but as yet the problem of storage in large quantities has not been satisfactorily solved. Because the known supply is limited, because it is escaping into the atmosphere at an estimated rate sufficient to fill four large airships weekly; and because of the tremendously increased value and safety which the use of helium would give to airships, particularly in warfare, it is, in the opinion of the National Advisory Committee for Aeronautics, the very essence of wisdom and prudence to provide for the conservation of large reserves through the acquisition and sealing by the Government of the best helium-producing fields. Attention now being given to the development of types of airships to realize fully the advantages which the use of helium would afford should be continued. Such development would give America advantages, for purposes either of war or commerce, with which no other nation could successfully compete

"Who's Who in American Aeronautics"

Every week, AVIATION AND AIRCRAFT JOURNAL prints the biographical sketch of men who are prominent in American Aeronautics. These sketches will be published later in pamphlet form. As so many of the officers change their stations often, it is believed that a semi-annual issue will be necessary. In compilations of this character many errors and omissions occur. It will be appreciated if corrections are sent to "Who's Who" Editor.

John B. F. Bacon

BACON, JOHN B. F. Coal Business; born Jacksonville, Fla., Aug. 24, 1891; son of Mark R. Bacon and Mary (Ford) Bacon.
Educated: Public schools of Wyandotte, Mich., 1911; Phillips Exeter Academy; Ph.B. 1915, Yale University.
Professional: President Bacon Fuller Coal Co. of Alabama.
Aeronautical Activities: Instructor, Engine Department, U. S. School of Military Aeronautics, Berkeley, Calif., during war.
War Service: As above.
Books: Elements of Aviation Engines.
Present Occupation: Coal business.
Address: 174 N. Biddle Ave., Wyandotte, Mich.

Wallace Kinney Harding

HARDING, WALLACE KINNEY. Lumber Business; born Windsor, Utah, March 22, 1891; son of Winn Jasper Harding and Linda Mable Harding.
Educated: West Lebanon High School, 1910; Dartmouth College.
Professional: Secretary Wellington Lumber Corp.
Aeronautical Activities: Ground School, M. I. T., 1918; flying training at Miami, Fla.; patrol duty at Cape May, N. J., 1918-1919.
Flying Rating: Naval Aviator No. 919, Aug. 1918; Ensign, Aug. 1918.
War Service: Navy, April 1917 to May 1919.
Member: Aero Club of America.
Present Occupation: Secretary Wellington Est. Lumber Corp.
Address: 59 Wall St.; home, 1931 Madison Ave., New York City.

Joy Gillian Jamison

JAMISON, JOY GILLIAN. Automobile Business; born LaFayette, Ind., Aug. 21, 1890; son of Clarence F. Jamison and Anna B. Jamison; married Ethel Jamison, Oct. 4, 1918.
Educated: Ford School, LaFayette, Ind.; La Fayette High School; Princeton Prep. School; Purdue University, 1912; Princeton University.
Professional: Automobile field, consulting and sales engineer.
Aeronautical Activities: S. M. A. Georgia School of Technology; Pilots School, Princeton and University of Texas.
Flying Rating: Reserve Military Aviator, March 1918.
War Service: Army, Jan. 1918 to Jan. 1919.
Member: Army and Navy Club.
Present Occupation: District Sales Manager, Anderson Motor Co.
Address: Rock Hill, S. C.; home, 2104 N. Meridian St., Indianapolis, Ind.

Thomas Dohoney Broad

BROAD, THOMAS DOHONEY. Architect; born Paris, Tex., April 27, 1893; son of Charles I. Broad and Annie (Dohoney) Broad.
Educated: Public schools of Paris, Tex.; B.S. in Architecture, 1916, University of Texas; Harvard Architectural School.
Professional: Architecture since 1919.
Aeronautical Activities: In Supply Dept. at Kelly Field; Maintenance Officer and Assistant Supply Officer.
Flying Rating: Reserve Military Aviator.
Present Occupation: Architect.
Address: 304 Commerce Bldg., Kansas City, Mo.

Walter J. Carr

CARR, WALTER J. Aviator; born Ladd, Ill., Jan. 15, 1890; son of Jay Carr and Lillian Carr.
Educated: Public schools of Illinois.
Professional: Aviation since 1914.
Aeronautical Activities: Flew exhibitions from 1914 to 1917; civilian flying instructor from Oct. 1917 to Dec. 1919; 1919 to 1921, commercial flying.
Flying Rating: Civilian flying instructor, Air Service.
Member: Aero Club of America.
Present Occupation: Aviator.
Address: 265 Malvern Place, Memphis, Tenn.

Harrison Williams Gill

GILL, HARRISON WILLIAMS. Architect; born Hannibal, Mo., Aug. 23, 1891; son of Everett Gill, Th.D., D.D., and Emma Geraldine (Williams) Gill.
Educated: Deutsche Schule at Rome, Italy; private tutors; A.B. 1911, William Jewell College, Liberty, Mo.; 1919-1921, School of Architecture, Columbia University.
Professional: Architectural Draftsman with Wight & Wight, Kansas City, Mo., 1913-1917; with Wilder and White, New York City, 1919-1920.
Aeronautical Activities: Ground School, Toronto University, 1917-1918; Taliaferro Field; Canadian Aerodrome; British Aerodrome; France and Belgium, Feb. 1918 to Feb. 1919; passenger carrying, 1919.
Flying Rating: Flight Lieutenant; Scout Pilot; Royal Aero Club certificate No. 8810.
War Service: Royal Air Force, Nov. 1917; commissioned June 1918; discharged June 1919.
Member: Services Club, Stratford Place, London, England; American Legion.
Present Occupation: Junior Architect, Wilder & White.
Address: 50 Church St.; home, 558 West 113 St., New York City.

William John Bingham

BINGHAM, WILLIAM JOHN. Mechanical and Structural Engineer; born St. James, Minn., April 10, 1896; son of Ralph A. Bingham and Margaret Bingham; married Julia M. Huber, Feb. 14, 1921.
Educated: Public schools, 1915; School of Military Aeronautics, University of Illinois.
Professional: Structural and Mechanical Engineer.
Aeronautical Activities: Training at Rich Field, 1918.
Flying Rating: Reserve Military Aviator, Nov. 1918.
War Service: Nov. 1917 to Jan. 1919; commissioned 2nd Lieut., A.S.A., Nov. 1918; commissioned 2nd Lieut., S.O.R.C., A.S., July 1919.
Present Occupation: Mechanical and Structural Engineer.
Address: 926 E. 3rd St., St. Paul, Minn.

Edward Earle Hughes

HUGHES, EDWARD EARLE. Automobile Business; born Florence, Ala., May 1, 1891; son of W. L. Hughes and Rachel V. Hughes.
Educated: Public schools; Electrical Engineering with C. C. S. schools.
Professional: Six years in automobile business.
Aeronautical Activities: 1918, S.M.A., Austin, Tex.; training at Camp Dick, Rich Field, Brooks Field and Kelly Field No. 2, 1918-1919; Gosport Flying Instructor.
Flying Rating: Gosport Flying Instructor, Brooks Field.
War Service: Air Service, Jan. 1918 to Jan. 1919.
Present Occupation: Supt. of Universal Motor Car Co.
Address: 991 Union Ave.; home, 848 Poplar Ave., Memphis, Tenn.

Hobert LaDoyt Wilson

WILSON, HOBERT LADOYT. Automobile Business; born Portland, Ind., May 19, 1895; son of George A. Wilson and Leila K. Wilson.
Educated: Public schools of Portland, Ind.; 1915-1916, Oberlin College.
Professional: Highway Transport Lines, Detroit, Mich., 1920.
Aeronautical Activities: S.M.A., Toronto University, 1917; School of Aerial Gunnery, Ft. Worth, Tex.; flying training at Thetford and Duxford, England, 1919; commercial aviation with Triangle Aircraft Association, Cincinnati, Ohio, 1919.
Flying Rating: Aero Club License No. 1907; Reserve Military Aviator, Feb. 1918; British Service Pilot, Nov. 1918.
War Service: May 1917 to Jan. 1918.
Member: American Legion; Aero Club of America.
Present Occupation: Sheridan Motor Car Co.
Address: 1901 E. Charles St., Muncie, Ind.

Harold Albert Kullberg

KULLBERG, HAROLD ALBERT. Sales Engineer; born Somerville, Mass., Sept. 10, 1899; son of Charles A. Kullberg and Hilda Kullberg.
Educated: Grammar school, high school, technical school, 1911, Wentworth Institute, Boston, Mass.
Professional: Sales Engineer.
Aeronautical Activities: Trained in Canada, Texas, England and France; civilian flying near Boston.
Flying Rating: Lt. Royal Flying Corps; F.A.I. No. 1247; R.F.C. No. 10983.
War Service: Aug. 1911 to July 1919, Royal Flying Corps and Royal Air Force.
War Honors: Distinguished Flying Cross, Sept. 1918.
Member: Massachusetts Aero Club.
Present Occupation: Sales engineer.
Address: 20 Central Road, Somerville, Mass.

Henry Theodore Hemming

HEMMING, HENRY THEODORE. Printing Business; born Canton, Mo., Aug. 10, 1899; son of Julius Theodore Hemming and Jonies Evalyn (Bailey) Hemming.
Educated: Canton, Mo., High School, 1915; Central College, Fayette, Mo., 1911; Culver Stockton College, Canton, Mo., 1918; S.M.A., Georgia Tech.
Professional: Printing business.
Aeronautical Activities: In charge Air Service School for Radio Mechanics, Carnegie Institute of Technology, 1918.
War Service: Air Service.
Present Occupation: Department of Research, United Typothetae of America.
Address: 550 Transportation Bldg., Chicago, Ill.; home, 401 N. Tenth St., Canton, Mo.

William Bennett Lehberz

LEHBERZ, WILLIAM BENNETT. Commercial Accountant; born Frederick, Md., Dec. 4, 1885; son of William H. Lehberz and Margaret I. Lehberz; married Harriett L. Bebney, April 29, 1914.
Educated: St. Johns Literary Institution, Frederick, Md.
Professional: 1905-1919, with Ox Fibre Brush Co. of New York.
Aeronautical Activities: 1916 to date with Gallaudet Aircraft Corp.; 1920 visited various European countries, studying the aircraft situation.
Present Occupation: General Manager, Gallaudet Aircraft Corp.
Address: East Greenwich, R. I.; home, 47 Lenox Ave., Providence, R. I.

Roy Victor Peel

PEEL, ROY VICTOR. Teacher; born Des Moines, Iowa, Feb. 21, 1896; son of Victor R. Peel and Hannah M. Peel.
Educated: East Des Moines High School; A.B. 1920, Augustana College.
Professional: Representative Carpenter Paper Co. 1920; Sept. 1920 to date, Instructor English, Trinity College.
Aeronautical Activities: Cadet, Jan. 1918 to Feb. 1919; training at Dallas, Tex.; Ithaca, N. Y.; Ft. Sill, Okla., and Post Field.
Flying Rating: Airplane Pilot.
Present Occupation: Teacher.
Address: Round Rock, Tex.; home, 1033 Pennsylvania Ave., Des Moines, Iowa.

James J. Gambs

GAMBS, JAMES J. Investment Banker; born Cincinnati, Ohio, Aug. 10, 1890; son of Jacob Martin Gambs and Anna Gambs.
Educated: High schools; A.B. University of Cincinnati.
Professional: Investment banking since 1912.
Aeronautical Activities: Commander 201st Aero Squadron, 1917-1918; Adjutant, First Aero Wing, 1918.
Flying Rating: Reserve Military Aviator.
War Service: Army, May 1917 to Nov. 1918; 1st Lieut., A.S.S.C.
Present Occupation: Investment banking.
Address: 2924 Saranac Ave., Cincinnati, Ohio.

Virgil Vincent McKenna

McKENNA, VIRGIL VINCENT. Aeronautical Engineer; born Brooklyn, N. Y., Nov. 5, 1894; son of John A. McKenna and Sara M. (Brady) McKenna.
Educated: Westbury Public School; St. John's Preparatory School; Polytechnic Institute, Brooklyn, N. Y.; Civil Engineer, 1911, Columbia University.
Aeronautical Activities: Ground School, M.I.T., 1918; preliminary training, Bayshore, L. I., 1918; advanced training, Pensacola, Fla.; course in aeronautical engineering, M.I.T., 1918-1919; Naval Aircraft Factory, Philadelphia; Aeronautical Engineer, Feb. 1919 to date (1921).
Flying Rating: Naval Aviator No. 1126.
War Service: As above.
Present Occupation: Aeronautical Engineer, Naval Aircraft Factory.
Address: Naval Aircraft Factory, Philadelphia, Pa.; home, Westbury, Long Island, N. Y.

Ralph Edgar Buckingham

BUCKINGHAM, RALPH EDGAR. Student; born Davenport, Iowa, June 11, 1890; son of Henry Edgar Buckingham and Amelia Buckingham.
Educated: Public schools of Davenport, Iowa; Coe College, Cedar Rapids, Iowa.
Aeronautical Activities: Ground School, Feb. 1911 to April 1918; training at Barron, Taliaferro and Langley Fields, May 1918 to Jan. 1919.
Flying Rating: Reserve Military Aviator, Sept. 1919.
War Service: Army, May 1917 to Jan. 1919.
Present Occupation: Student.
Address: 232 Washington St., Davenport, Iowa.

Franklin Frederick Snyder

SNYDER, FRANKLIN FREDERICK. Aviator; born New York, N. Y., Sept. 22, 1895; son of Franklin Snyder and Martha V. (Schiller) Snyder.
Educated: Public schools and private tutors.
Professional: Lithographic advertising.
Aeronautical Activities: Entered aviation school July 1911; training at Camp Dick, Dorr Field, Barron Field, Rockwell Field to Feb. 1919; Pilot for Long Island Aviation Co. and the American and Canadian Allied Flying Circus, Inc., March 1919 to Aug. 1920; Lieut. New York Aerial Police Reserve, Nov. 1919 to date.
Flying Rating: Reserve Military Aviator; civilian aircraft flying license No. 645; International Pilot Certificate No. 2885.
War Service: As above.
Member: Aero Club of America.
Present Occupation: Chief Instructor, Snyder Aviation School.
Address: Pulitzer Bldg., New York City; home, 1389 Dean St., Brooklyn, N. Y.

Carl Henry Grohe

GROHE, CARL HENRY. Naval Aviation Pilot; born Hoboken, N. J., May 12, 1900; son of Herman George Grohe and Margaret Louise Grohe.
Educated: Public schools of Hoboken, N. J.
Professional: Professional tennis 1915-1911; L.W.F. Engineering Co., assembling Navy HS2L seaplanes, 1917-1918.
Aeronautical Activities: 1917-1918, L.W.F. Engineering Co. and Standard Aircraft Co.
Flying Rating: Naval Aviation Pilot No. 40.
War Service: Naval Aviation, May 1918; instructed in Aviation Mechanics School, Great Lakes, Ill.
Member: Aero Club of America.
Present Occupation: Naval Aviation Pilot, Atlantic Fleet Air Force.
Address: 1317 Washington St., Hoboken, N. J.

Gideon A. Blewett

BLEWETT, GIDEON A. Topographer; born Coal Hill, Ark., Dec. 9, 1894; son of Gideon F. Blewett and Francis (Hareison) Blewett.
Educated: Public schools of Higginsville, Mo.; College of Arts and Science, University of Missouri.
Professional: Engineering Department, Missouri, Kansas and Texas Railway, 1916 to date (1921).
Aeronautical Activities: Enlisted, Oct. 1917; commissioned 2nd Lieut., June 1918; Pursuit Training, 3rd A.I.C., Issoudun, France, A. E. F., 1918; commissioned 2nd Lieut., A.S.R.C., May 1919.
Flying Rating: Reserve Military Aviator, June 1918.
War Service: As above.
Member: American Association of Engineers (Junior).
Present Occupation: Topographer, Railway Location.
Address: Higginsville, Mo.

Franklin Young

YOUNG, FRANKLIN. Mining; born St. Joseph, Mo., Dec. 14, 1893; son of Benjamin Franklin Young and May Gertrude Young.
Educated: Public schools; Southern College.
Professional: American Motor Co., Battle Creek, Mich.; Chalmers Motor Car Co.; Packard Motor Car Co.
Aeronautical Activities: Ground School, Pensacola, Fla., 1917; flying training in A. E. F. at Tours and St. Raphael; received French Brevet, Oct. 11, 1917; Instructor, U. S. Naval Aviation School, Moutchic; advanced training at Issoudun; on duty Dunkirk, France, and Bolsena, Italy; Instructor and Test Pilot, U. S. Naval Air Station, Key West, Fla.; first places from turret platform U.S.S. Mississippi; Instructor, U. S. Naval Air Station, San Diego, Calif.
Flying Rating: French Brevet, Oct. 11, 1911; U. S. Naval Aviator No. 701; F.A.I. license, Aero Club of Italy No. 413, 1918; Brevetto Superior, Aero Club of Italy; Aero Club of America license No. 958, 1921.
War Service: U. S. Naval Aviation duty, April 1917 to June 1918; U. S. Naval Reserve Force, 1918 to date; inactive duty Oct. 11, 1920.
Member: Aero Club of America.
Present Occupation: Mining.
Address: Ozona, Fla.

Herbert Kellman

KELLMAN, HERBERT. Tree Expert; born Barbados, B. W. I., June 11, 1893; son of Edward O'Donald Kellman and Amy (Douglas) Kellman.
Educated: Combermere School, Barbados, B. W. I.
Professional: Tree surgeon with Davey Tree Expert Co., Kent, Ohio, 1915 to 1911; with A. F. W. Vick Co., Philadelphia, 1919 to date.
Aeronautical Activities: Cadet Royal Flying Corps, Sept. 1911 to June 1918; 2nd Lieut. Royal Air Force, July 1918 to June 1919.
Flying Rating: Airplane Pilot, July 1918.
War Service: Royal Flying Corps and Royal Air Force, Sept. 1917 to June 1919.
Member: Royal Aero Club, London, England.
Present Occupation: Tree expert.
Address: 709 Harrison Bldg.; home, 224 W. Rittenhouse St., Germantown, Philadelphia, Pa.

Samuel Hollingsworth Paul

PAUL, SAMUEL HOLLINGSWORTH. Manufacturing; born Chestnut Hill, Philadelphia, Pa., July 9, 1890; son of Mr. and Mrs. Henry N. Paul.
Educated: Northeast High School, Philadelphia, Pa.; Cornell University.
Aeronautical Activities: Received instruction at Essington, Pa., on flying boats 1911; instructed in acrobatics at Lake Charles; commissioned Captain and Flight Commander of 138th Aero Squadron; gunnery instruction at Issoudun, France.
Flying Rating: Reserve Military Aviator.
War Service: May 1917 to Aug. 1919.
Member: Aero Club of Pennsylvania; Aviators Club of Philadelphia.
Present Occupation: Steel locker business.
Address: Camden, N. J.; home, Chestnut Hill, Philadelphia, Pa.

William Eyres Sloan, Jr.

SLOAN, WILLIAM EYRES, Jr. Plumbing Supplies; born Rochester, N. Y., May 30, 1898; son of William Eyres Sloan, Sr., and Emily Louise (Harris) Sloan.
Educated: Phillips Academy, 1919; Princeton University.
Aeronautical Activities: Ground School, M. I. T.; training at Bayshore, L. I.; Pensacola, Fla., and Hampton Roads, Va., June 1918 to Jan. 1919.
Flying Rating: Ensign, Naval Aviator No. 1048, Aug. 1918.
War Service: Navy, May 1917 to Jan. 1919.
Present Occupation: Wholesale Plumbing and Heating Supplies.
Address: 97 Exchange St.; home, 1250 East Ave., Rochester, N. Y.

Frederick Gordon Erney

ERNEY, FREDERICK GORDON. Athletic Instructor; born Del Rio, Tex., July 19, 1891; son of Thomas Erney and Annie (Gordon) Erney.
Educated: Public schools of Del Rio and Galveston, Tex.; Southwest Texas State Normal College, 1914; University of Texas.
Professional: Teacher in country schools three years; 1914 to date, high school Science Teacher and Athletic Director.
Aeronautical Activities: S.M.A., Austin, Tex., Dec. 1917 to Feb. 1919; training at Camp Dick, Kelly Field and Brooks Field; Flying Instructor, Call Field.
Flying Rating: Certificate No. 5310, 1919.
War Service: As above.
Present Occupation: Director of Athletics, Cleburne High School.
Address: Del Rio, Tex.

Sherman E. McNamara

McNAMARA, SHERMAN E. Insurance Business; born Buffalo, N. Y., March 9, 1891; son of Patrick J. McNamara and Elizabeth T. McNamara; married Margarette Walsh, June 2, 1920.
Educated: Public schools of Buffalo, N. Y.
Professional: 1912, Railroad work; 1914-1917, banking; 1919 to date, insurance.
Aeronautical Activities: Nov. 1917 to March 1918, Ground School, Georgia School of Technology; commissioned and assigned to the Supply Division of Balloon Section, Kelly Field, for flying training, Sept. 1919 to Jan. 1919.
War Service: Nov. 1917 to Jan. 1919.
Member: Aero Club of America.
Present Occupation: Assistant Treasurer, Merchants Mutual Auto Liability Insurance Co.
Address: 168 Franklin St.; home, 19 Orange Place, Buffalo, N. Y.

Albert John Cleare, Jr.

CLEARE, ALBERT JOHN, Jr. Salesman; born Toronto, Ontario, Canada, Nov. 19, 1895; son of Albert John Cleare, Sr., and Susie (Troland) Cleare.
Educated: Bryn Athyn Academy, Bryn Athyn, Pa.
Aeronautical Activities: Cadet in R.F.C.; sent to Camp Long Branch, Toronto, for course in Wireless and Gunnery; S.M.A. University of Toronto; sent to Taliaferro Field for training; 54 combats over lines.
Flying Rating: F.A.I. Certificate No. 1262.
War Service: R.F.C., Sept. 1911 to April 1918; R.A.F., April 1918 to July 1919.
War Honors: Officially credited with having destroyed three enemy machines.
Member: Royal Aero Club of the United Kingdom.
Present Occupation: Salesman.
Address: 1944 Ingleside Terrace, Washington, D. C.

Marshall J. Barlow

BARLOW, MARSHALL J. Banking Business; born Thornton, Iowa, July 9, 1899; son of James D. Barlow and Harriette M. Barlow; married R. E. West, Jan. 2, 1920.
Educated: Public schools of Thornton, Iowa; State University of Iowa.
Aeronautical Activities: Training at Ft. Omaha, Neb.; Camp Dick; S.M.A., Ithaca, N. Y.; Post Field and Camp Dodge, Feb. 1918 to March 1919.
Flying Rating: Reserve Military Aviator.
Member: Flyers Club, University of Iowa.
Present Occupation: Banking business.
Address: Gilmore Exchange Bank, Gilmore City, Iowa.

Edwood Axberg

AXBERG, EDWOOD. Aviator; born Lake Park, Minn., Dec. 24, 1899; married Pearl Copell, Nov. 24, 1919.
Educated: 1913-1915, Spokane & Eastern Trust Co., Spokane, Wash.; 1915-1911, Enderlin State Bank, Enderlin, N. D.
Aeronautical Activities: Cadet course from May to Sept. 1918 at Carruthers Field; Instructor to 1919; civilian flying 1919-1921.
Flying Rating: Reserve Military Aviator, Sept. 1918; Aero Club of America certificate No. 3492, Dec. 1919.
Present Occupation: Commercial aviation.
Address: Box 741, Fargo, N. D.

Gerald Faulkner Coons

COONS, GERALD FAULKNER. Oil Business; born Des Moines, Iowa, Feb. 21, 1893; son of Arian W. Coons and Lida May (Faulkner) Coons.
Educated: Public schools of Des Moines, Iowa; Basin, Wyo., 1919-1919; University of Wyoming.
Professional: Crude oil production 1916-1921; 1921, oil well supplies.
Aeronautical Activities: Commissioned 2nd Lieut. Sig. R. C., A. S., Nov. 1917; served at Kelly Field and Rich Field, flying training, Aug. 1919 to Aug. 1919.
War Service: May 1917 to Aug. 1919.
Present Occupation: With National Supply Co.
Address: National Supply Co., Casper, Wyo.; home, Basin, Wyo.

Charles Robert Rhodes

RHODES, CHARLES ROBERT. Farmer; born Golden Lake, Ark., Sept. 12, 1888; married June 12, 1912.
Educated: B.E.E. 1909, University of Arkansas.
Professional: 1909-1921, Farmer.
Aeronautical Activities: Naval aviator and patrol pilot.
Flying Rating: Naval Aviator No. 711, July 9, 1919.
War Service: Navy, Oct. 1917 to Jan. 1919.
Present Occupation: Farmer.
Address: Golden Lake, Wilson, Ark.

Trials of Helium Filled Airship C-7

The U. S. Navy's non rigid airship C-7 is the first lighter-than-air craft in the world to make a flight inflated with helium gas.

The airship left the Naval Air Station at Hampton Roads, Virginia, at 6:37 a. m. arriving at Anacostia at 10 20 a. m after going over the city. On her return trip she left the Air Station, Anacostia, at 12.03 p. m again circling the city, and reaching Hampton Roads at 4 30 p. m. The flight was made without mishap of any kind

Prior to this trip a thoroughly satisfactory flight of about forty five minutes was made, followed by a second flight of about fifteen minutes duration. The performance of the airship on both these flights was excellent

The crew for the initial flight was as follows: Lieut Comdr Zachary Lansdowne, U. S. N., commanding officer, Lieut. Comdr. R. F. Wood, altitude pilot; Lieut. A. T. Sewell, direction pilot, Chief Machinist Mate Ferris, engineer.

During the three flights of the airship C-7, no helium whatsoever was lost in operation by valving.

Advantages of Helium

The great advantage of helium gas over hydrogen is that it is not liable to explosions due to static or electric connections, or from ignition due to sparks from the exhausts of the engines. Probably the greatest disadvantage in the use of helium is its cost of production, its availability and its buoyancy, as compared to that of hydrogen. Hydrogen with 100 per cent purity and under standard atmospheric conditions has a buoyancy of 70 lb. per 1000 cu. ft. of air displaced, while helium under similar conditions has 64.4 lb. lift. When helium has lost purity and consequently lift on account of diffusion with air it can be put through a repurification process and used again.

The Navy maintains a helium plant at Fort Worth, Texas, where helium is extracted from natural gas by compressor systems. It is required that a plant of this character be located where there is an abundance of gas and also an abundance of water for cooling the numerous compressors. The natural gas, after passing through this plant, becomes a purer illuminating gas than before when it is then returned to the gas company for commercial use. The natural gas is first passed through lime which removes carbon dioxide, it is then liquified, leaving nitrogen and helium gases which are drawn off and further compressed thereby liquifying the nitrogen and leaving the helium which is drawn off and compressed into cylinders and placed in storage for shipment.

Naval Airship Types

The Navy has been operating single-engined airships mainly for training purposes—the envelopes for these small airships have capacities ranging from 64,600 to 95,600 cu. ft. with dimensions roughly of 162 ft. in length and maximum diameter of 33 ft., the height of the ships being 48 ft. These small types carry a crew of three men, machine guns or bombs and sufficient gasoline at cruising speed of 35 m.p.h. to carry Class B ships a distance of 927 miles, class E ships 672 miles and class F ships 1227 miles.

The Class C ships are twin engined and especially valuable for patrol and convoy work. Their dimensions are, length, 192 ft., maximum diameter of envelope 41 ft. 9 in.; maximum height 60 ft., maximum width, 53 ft. 7 in. The envelope has a designed volume of 181,000 cu. ft. Their fixed weight ready to fly is 7,940 lb., leaving the balance for disposable weights consisting of crew, gasoline, oil, navigating equipment, radio, food, drinking water, ballast, bombs, guns, etc. The 181,000 cu. ft. capacity gives a gross lift for pure helium of 11,656 lb., making 3716 lb. of lift available for the above mentioned disposable weights as against 4,760 lb. with a hydrogen gas purity of 98.6 per cent.

Class C airships have two engines capable of developing 125 horsepower at full speed giving the ship a speed of 55 m.p.h.; at half power the ship consumes 134 lb. of fuel per hour. At cruising speed of about 45 m.p.h. this ship has a cruising range of 2180 miles. They are designed with sufficient ballonet capacity to reach an altitude of 8,600 ft.

Naval airship operations up to the present time have been mainly convoy, patrol, and photographic flights, their primary military value has been in antisubmarine warfare. It is expected that with the advent of rigid airships into the Navy this field of operations will be greatly broadened in extensive scouting and reconnaissance activities. It is probable also that airships may prove their usefulness in high altitude bombing and spotting work. Due to an airship's ability to hover over one spot they are extremely well fitted for the work of locating floating or surface mines and destroying them.

Naval Value of Airships

The airship's greatest value to the Allies during the past war was in convoy work. It was particularly noticeable that a submarine would not attack a convoy that was escorted by airships. The value depended not so much on their ability to detect a submarine previous to its attack on the convoy as on the certainty of the airship locating the submarine after a torpedo attack, and radioing its position to surface craft, which would result in the destruction of the submarine by depth charges from either the airship or the surface escort.

An advantage of airships over other types of aircraft is their ability to fly safely in fogs, rain, or at night. In fact, the airship is infinitely more easy to handle at night or in a fog than on the average day, because of their great sensitiveness to the stability of the atmosphere.

Communications between airship and shore stations is maintained by homing pigeons and radio. The radio compass is used to aid navigation in that an airship can locate itself by radio compass bearings taken aboard the ship, or by getting bearings from radio compass stations.

Type C airships require both altitude and directional pilots. The directional pilot is placed in the front cockpit and operates the steering wheel, while the altitude pilots sit in the second cockpit in the fuselage and operate the gas and air valves and engine throttles. The mechanic and radio operator occupy the rear cockpit. On long voyages there would be three pilots, one mechanic and one radio operator, and all unnecessary equipment for that particular flight would be sacrificed for ballast. The ballast may be surplus gasoline or water. When water or gasoline is not discharged for ballast, sand is used. Gasoline is only used for ballast in cases of extreme emergency.

Flying in the Philippines

Commenting on the varied character of the country encountered by the airplane pilot on duty in the Philippines, the Commanding Officer of Clark Field, Camp Stotsenburg, Pampanga, P. I., states that flying throughout the islands is hazardous away from the airdromes. "The abundance of rice paddies, the uneven and heavily overgrown contour, now gently rolling, then abruptly mountainous, combine in presenting but few routes on which emergency fields are to be found. While in most rice sections in the States no very great hazard is encountered through emergency landings in the paddies, the local paddies are deeply terraced to overcome the unevenness of terrain. So far there is no record of a forced landing here in a cane field, but it is believed the heavy stalks would not prove an easier place to set the plane down than a paddy. While on the subject of the islands it is surprising to note the seemingly numerous localities which are little, if at all, known to white men. The peak of Mt. Pinatuba, approximately 12 miles airline from Clark Field, is said to be inaccessible, the sides of the mountain being sheer or extremely precipitate and the approaches heavily obstructed by tropical vegetation. It is also said that a tribe of Moro headhunters infest the region, which does not add to our enthusiasm for exploring too far afield in that direction."

Naval Aviation *

Rear Admiral Wm. A. Moffett
Chief of Bureau of Aeronautics

Naval aviation activities during the fiscal year ending June 30, 1921, continued to be scattered throughout various offices of the different bureaus of the Navy Department. With the lack of a coordinating central office to handle aeronautical matters conditions were especially trying in the endeavor to promote naval aviation. This condition continued until Sept. 1, 1921, when the Bureau of Aeronautics was established in the Navy Department. Notwithstanding the trying conditions that have existed during the past year, progress has been made both in the development of types of planes and in general aeronautical research work. Some of the outstanding features of the year's work cover the following:

(a) Flights of the Atlantic and Pacific Fleet air forces to the Panama Canal and their return.

(b) The flight of the F-5-L flying boats from Coco Solo, Canal Zone, to Cartagena, Colombia.

(c) Marine Corps flight from Washington, D. C., to Santo Domingo City and return.

(d) Bombing experiments conducted on the ex-battleships Indiana and Iowa, and on ex German warships.

(e) Practical completion of the large rigid airship shed at Lakehurst, N. J., and advancement in the construction of the rigid airship ZR-1 at the naval aircraft factory.

(f) The completion of a competition for the design of planes suitable for use from battleships.

(g) The continued progress in fitting the U. S. S. Langley as an aircraft carrier.

(h) The practical completion of the U. S. S. Wright as a lighter and heavier than air tender for aircraft with the fleets.

(i) Mileage flown by naval and marine aircraft for the fiscal year, 2,511,055 miles.

The value of naval aircraft to the fleets has been demonstrated in spotting gunfire, in scouting, and in bombing.

Last year radio communication between aircraft and surface vessels was very elementary. Development has been made during the past year so that it is now possible for an airplane to be in direct radio communication with land stations and surface craft for considerable distances and under adverse weather conditions.

Heavier than Air

The accomplishments of the fleet air forces have been particularly gratifying. Nine F-5-L flying boats of the Atlantic Fleet air force made the trip from Philadelphia to the Canal Zone and return. Twelve F-5-L flying boats of the Pacific Fleet air force flew from San Diego to the Canal Zone and return. The actual distance covered in the flights of these two detachments approximate 12,000 miles.

Other flights of note during the past year were those of two DH-4B airplanes by the Marine Corps, from Washington, D. C., to Santo Domingo City and return, and the flight of F-5-L flying boats from Coco Solo, Canal Zone, to Cartagena, Colombia. The marine flight covered a distance of approximately 5,400 miles and the flight from Coco Solo a distance of about 800 miles.

Attempts have been made to obtain torpedo planes, and, while the designs are promising, the manufacturers have failed, in all cases, to deliver the planes upon the date promised. This delay on the part of the manufacturers of the torpedo planes has prevented equipping the torpedo squadrons with modern planes.

In addition to the torpedo instruction that has been given at Pensacola, Fla., and the training flights and firing of dummy torpedoes at San Diego, the Atlantic Fleet torpedo division has operated from Yorktown, Va., as a base, and has conducted experimental research work in firing actual, as well as dummy, torpedoes.

The air forces of each fleet are now composed of scouting, spotting, combat, torpedo and bombing, and kite balloon squadrons.

As a result of competition among the aircraft manufacturers of the United States a type of plane suitable for spotting work is being developed, the award having been made to the winner of this competition, the Dayton Wright Co., and they are now engaged in producing the first planes of this type. To date none have been delivered.

The Pulitzer airplane race held in November, 1920, was participated in by airplanes entered by the Army and Navy and it was won by an Army plane fitted with a 600-horsepower engine. The race for the Pulitzer trophy did bring out the fact, however, that engines, and especially engine accessories, were unreliable, and a large percentage of the planes which entered failed to finish. The Navy Department has adopted the policy that airplane racing while not of military value in itself is of great technical importance in subjecting service material, especially power plants, to conditions of maximum severity.

For the Pulitzer race of November, 1921, the Army and Navy had intended to enter the fastest planes in each service, but, due to the limited appropriation and the economy program, no entries were made directly by the two services. However, it was arranged by the Army and by the Navy to loan to contractors planes which had been built by them for this race for the purpose of entering them in the contractor's name and at his risk and expense. The race this year was won by a Navy plane loaned to a contractor in this manner fitted with a 400 hp. engine and showed a higher speed than the 600 hp. plane which won the last year's race. This indicates very satisfactory progress in aeronautical design in the past year. The reliability of the planes taking part in the race was better than the year before but still leaves room for improvement.

The question of developing a means for launching planes from battleships while under way or at anchor, which would do away with the objections to the platforms now installed on the guns, has been undertaken and further development of the catapult, as originally suggested by Capt. W. I. Chambers, United States Navy, is in progress and appears to offer a solution to many of the difficulties encountered with the turret platforms.

The past year witnessed the successful completion of the new catapult design for launching airplanes or seaplanes from ships of the fleet. This catapult was a development of the catapult that was installed on the North Carolina class of vessel before the war, but has been refined and simplified and reduced to a small track rotating on a turntable base. Successful flights have been made with this catapult using standard service seaplanes.

The significance of the catapult development lies in the fact that it is now possible to provide ships of the fleet with fighting airplanes as an answer to the menace of bombing aircraft. The best defense from aerial bombs is considered to be the small fighting airplane which can be shot into the air at a moment's notice from a ship's catapult and sent aloft to shoot down the attacking bombers which will be necessarily slow and cumbersome weight carriers, and, as such, extremely vulnerable to attack by planes of the combat type.

The vessels U. S. S. Shawmut, U. S. S. Aroostook, U. S. S. Harding, U. S. S. Mugford, U. S. S. Sandpiper, U. S. S. Teale, and two submarine chasers which were hurriedly converted and adapted to work with aircraft of the fleets immediately after the war, are to be gradually replaced by ships which have been converted especially for this purpose. Among them is being converted the U. S. S. Wright a former type B Shipping Board vessel, for use as a heavier and lighter than air tender. The work on this ship is rapidly nearing completion, and it is expected that it will be commissioned and assigned to the fleet some time this fall.

* From the Annual Report of the Secretary of the Navy.

The U S S Langley, ex-Jupiter, which is being converted as an experimental carrier, has been somewhat delayed owing to the fact that the contractor has been unable to meet the dates to which he originally agreed However, it is expected that this ship will be commissioned this winter or in the early spring The Langley will afford a means for working out and for solving the various problems of launching and flying from a ship at sea, the study and handling of aircraft, and all of the various problems that are necessary in order to design a proper aircraft carrier Two modern carriers have been requested of Congress.

Lighter than Air

Definite progress has been made toward the completion of the rigid airship ZR-1 under construction at the naval aircraft factory in Philadelphia and the erection of this airship will take place at the naval air station, Lakehurst, N. J., where the world's largest airship shed has been practically completed

As a result of successful experiments carried out abroad in mooring rigid airships to a mast, such a mast has been erected at Lakehurst, N J The success of the mooring mast will facilitate practically and economically the handling and operation of airships and increase their field of usefulness, as the weather limitations attendant upon operation from sheds and the expense connected with the construction of these large sheds will be for the most part eliminated

Personnel, both officers and men, have been trained at Howden, England, in rigid-airship work. The regrettable disaster which overtook the R 38 (ZR-2) in August has retarded the Navy's rigid-airship program, and the service has suffered an inestimable loss in splendid personnel

The history of the airship R-38 (ZR-2) is briefly as follows

In the summer of 1919 an agreement was reached between the Navy Department and the Air Ministry that the United States would purchase from the British Government the partially completed rigid airship R-38 at a cost of $2,000,000 and in event of total loss to this airship before acceptance by the United States the two Governments would jointly bear the loss on an equal basis.

The airship was completed in June, 1921, and during her fourth trial, on Aug 24, 1921, prior to her acceptance by the United States, broke in two parts and fell, a total loss, into the Humber River, off Hull, England. There were 49 persons on board, of whom 17 were Americans There were 5 survivors, one of whom was an American.

The court of inquiry ordered by the British Air Ministry found that the cause of the accident was the failure of the structure in the rear of the after engine cars when being subjected to rudder and elevator tests at a speed of 45 to 50 knots. Almost extreme helm with a quick reversal was being used, which brought a heavy force on the after portion of the hull, due to the swing of the stern The ship broke in two portions and the forward portion caught fire at the fracture at the moment of or shortly after separation The fire probably originated in a spark from the electric leads which became fractured at a point in the immediate vicinity of a similar fracture in the gasoline mains As all sources of electrical energy were situated in forward portion only, the rear portion was not affected, as the electric leads in the latter portion became dead immediately the fracture took place. The fire in the forward portion spread rapidly, due to the presence of escaping gasoline in the keel An explosion followed, which led to the collapse of the structure and the ignition of the liberated hydrogen gas. A second explosion took place when the forward portion reached the water Meanwhile the after portion descended comparatively slowly but did not catch fire, four of the five survivors were in this portion and were rescued uninjured

The R 38 was the largest rigid airship ever built, and her characteristics were as follows: Gas capacity, 2,724,000 cu. ft., length over all, 698 ft., diameter, 85.5 ft.; gross lonnage, 83 tons; useful lift, 50 tons, brake horsepower, 2,130 hp., estimated speed, full power, 70 m p h., estimated speed, half power, 55 m p h., approximate endurance, full power, 5,000 miles, 73 hr., approximate endurance, half power, 8,000 miles, 146 hr

The non-rigid airships have been confined to training personnel and experimental development work in order to perfect the type Two thousand two hundred and twenty-three hours of flying, or approximately 100,000 miles, have been flown toward the accomplishment of the above. The bureau has under construction a new design of this type of aircraft

Exercises with kite balloons in the Atlantic and Pacific Fleets have been continued with a view to determining their usefulness and the methods of their employment in the fleet A total of 1,253 flights have been made

The U S S Wright will be shortly commissioned as a lighter-than-air and heavier than-air tender for the fleet, and will be provided with kite balloons. This vessel is constructed with a kite balloon well and equipped with a hydrogen generating plant

Tests will be conducted in the near future on an enlarged and improved type of kite balloon of 50,000 cu. ft. gas capacity

The Navy entered a balloon in the national balloon race held at Birmingham, Ala., on Sept 25, 1920

The helium plant at Fort Worth, Tex., has been placed on a production basis, and progress is being made in the development of the helium A nonrigid airship of the C class is being inflated with helium at the naval air station, Hampton Roads, and a practical demonstration of the use of this gas will shortly be made. This will be the first airship that has ever been operated with an inert gas.

Spotting and Control of Gunfire

Spotting and control of gunfire by aircraft has been continued in both the Atlantic and Pacific Fleets. In the Atlantic Fleet the spotting has been carried on from the F-5-L type flying boats and in the Pacific from the smaller ship-plane type of planes Considerable progress has been made in this work, and the results obtained have been very satisfactory

Photography

The past year has been one of training and development in the work of naval photography During this time sufficient men have been trained in aerial photography to man all aviation stations and bases, and additional men have been trained in motion-picture photography.

The development of a plane suitable for photographic work has been undertaken and a plane of this type will be ready for delivery this coming fall

Two projects of a large nature during the year have been undertaken, namely, the construction of a photographic map of the Mississippi Delta, for the Coast and Geodetic Survey, and the photographic mapping of the naval reservation at Guantanamo Bay for the Hydrographic Office Experimental work in connection with the rapid development of photographs, the actual development of photographs in planes, accurate and a standardized system of photographic mapping, have been undertaken with success

The use of aerial photography in determining the results of gunfire has been undertaken and found of great assistance to the office of gunnery exercises in determining accurately the results of gunfire in target practices.

There has been a constantly increasing demand for aerial photography, not only by the bureaus of the Navy but by other departments of the Government, such as the United States Coast and Geodetic Survey, Army Engineers, Interior Department, Department of Commerce, etc

(To be continued)

Acrobatic Contest, Omaha Meet

We are informed by the Longren Aircraft Corp., that the statement which appeared in the Nov 14, 1921, issue of AVIATION AND AIRCRAFT JOURNAL to the effect that the new Longren airplane won the acrobatic contest at the Omaha meet is erroneous, as said event was won by a Laird "Swallow" piloted by Hodge Smith of Grand Island, Nebr

As a matter of fact, at the time the acrobatic contest was held the new Longren airplane participated in the 150-mile efficiency race, in which it finished second, carrying a useful load of 507 lb for a total loaded weight of 550 lb

School of Aeronautics, Research University

A school of aeronautics, known as the Research University, has been opened in Washington, D C A number of students are registered for both correspondence and residence courses under leading experts of the goverement L D Seymour, consulting engineer of the Information Group of the Air Service, has been added as instructor in aviation engines and has worked out the course in this subject for correspondence students Mr Seymour has had unusual training and experience for this work, both in this country and in France Students are given very practical and thorough training on the finest type of engines now manufactured The course has appealed to a large number of automobile mechanics who desire to study higher types of engines than are now used in automobiles.

Richard A. Smith, B S, B E, aeronautical engineer, in charge of the Aerodynamic Laboratory, U S Navy Yard, is teaching the residence course in aerodynamics, and is working out the course and correcting the papers for correspondence students. The is a fundamental course of a very thorough character, not usually given in ground classes in aviation, and is fundamental to all training in aviation

Charles Ingram Stanton, assistant general superintendent of the U S Air Mail Service, is instructor in airplane operation and construction. Mr Stanton has charge of the best type of commercial air service now in operation in the United States, and students are intensely interested in his courses.

Research University is a non-profitmaking institution, in close cooperation with the government departments, with a board of trustees, faculty, and student body made up largely of federal employees Tuition fees are low, and no pains are spared in making the work intensely practical and helpful to those who take the courses Some six to ten books prepared by government experts are given to each student free of charge

The aviation course is six months in length for resident students, while correspondence students may take a year in which to complete the twenty-four sections of each of the three courses. As a matter of general mechanical and engineering training the course is very valuable, and a number of students are taking it with no intention of flying, but for the purpose of getting a thorough understanding of mechanical principles and of aviation

General Mitchell Goes Abroad

Brig Gen William Mitchell sailed from New York, Dec 10 to make a two months trip to Europe Accompanying him are Lieut Clinton L. Bissell and Aeronautical Engineer Alfred A Verville General Mitchell will visit Paris, Toulon, Rome, Milan, Turin, Coblenz, Berlin, Amsterdam, London and other places at which there are aeronautical activities. The trip is primarily to acquaint the Air Service with recent aviation progress and it is expected that General Mitchell will secure much valuable information about commercial as well as military aviation As the hearings on the aviation policy of the United States before Congressional Committee will not take place until after the Washington Conference concludes its main deliberations, it is expected that General Mitchell will be able to give the latest information as to European air routes and development

Mrs. Arthur Young of Milwaukee, General Mitchell's sister, flew in an Aeromarine flying boat to see him off Leaving Eighty-second St, a quick trip was made to the Rotterdam, where after circling the ship several times a letter was dropped on board This is the second time that the device for this purpose has been used

Farman Airplanes

In order to facilitate operations in this country, W Wallace Kellett, American representative for H & M Farman, has incorporated under the firm name of Wallace Kellett Co, Inc.

The company continues to represent the Farman airplanes in the United States, and there will be no change in the Farman policy Offices remain as previously in the Widener Bldg, Philadelphia, Pa.

Roma Makes Maiden Trip

The Roma, the largest American airship ever flown, made her initial flight at Langley Field, Va., on Nov. 15, with successful results. The airship left her berth at 9 a. m. sliding smoothly out of the big hangar under the direction of Chief Maneuvering Officer, Captain Dale Mabry, Air Service, and through the excellent unified efforts of her ground crew of 200 enlisted men. The task of tuning up each of her six motors, weighing off and assembly of passengers and crew occupied about n half hour's time, and at 9 40 a. m. the ship was ready to take off on her maiden trip In taking off she was free ballooned to a height of 400 ft. and gradually gained attitude as she headed for Chesapeake Bay. Most of her flight was made at a height of 200 meters. After the ship had circled the field several times and a complete inspection from nose to tail showed all parts functioning properly, she was headed for Norfolk and the U. S Navy Yard, flying across historic Hampton Roads.

Shortly after 11 o'clock the first mishap of the flight occurred, when the propeller blades on the left forward motor were broken by a small aluminum door on the engine compartment falling into the propeller Splinters from the damaged propeller tore a large hole in the keel cover, while several small openings were made in the lower diaphram of No 3 gas compartment.

With alert mind, in keeping with the responsibility of his position, Technical Sergeant Lee M Harris, engineer for the left forward motor, immediately cut his switch and stopped his engine, thereby lessening danger from fire, while in the next instant he climbed into the ballonet to ascertain the amount of damage done. Gas was valved out of the compartment to reduce the pressure so that repairs could be made. In addition to Sergeant Harris, Master Sergeant William Fitch and C E Brannigan worked at repairing the leaking chamber, all three men being rendered temporarily unconscious by the hydrogen gas they breathed The ship continued to function, although the forward motors were stopped At 1 12 p m she landed at the field, after the thoroughly successful flight, which was made primarily for purposes of inspection.

A test flight will be made in the near future, at which time minor changes will have been made as the result of observations made during the inspection flight. Among changes will be the addition of shutters for the radiators of the Ansaldo motors, which it is said operated at too cold a temperature throughout the first flight.

Radio connection, both by telephone and telegraph, were maintained with the field throughout the trip, amateur operators also reporting that by listening in they were in touch with the big ship and heard of the accident to the propeller before the ship was in sight and long before she landed

Thirty-one men, including the passengers and crew, were carried on the trip

Coming Aeronautical Events

AMERICAN

Jan 9—Annual Banquet, Aero Club of America.
Apr 30—Spring Show and Opening Meet, Curtiss Field, Mineola, L. I.
Sept 4—Detroit Aerial Water Derby, Detroit. (Curtiss (about) Marine Flying Trophy Competition.)
Sept 15—Detroit Aerial Derby, Detroit. (Pulitzer Tro- (about) phy Race.)
Sept 30—First Annual Interservice Championship Meet. (In preparation.)

FOREIGN

Aug 1—Coupe Jacques Schneider (Seaplane speed (about) race.) Italy, probably Venice.
Oct 1—Coupe Henri Deutsch de la Meurthe. (Airplane speed race.) France.
American elimination trials, if required, to be held about Aug 15, at Mitchel Field, L. I.

Annual Banquet, Aero Club of America

The 14th Annual Banquet of the Aero Club of America will be held this year in the Grand Ball Room of the Hotel Commodore, New York City, at 7:30 Monday evening, Jan 9, 1922.

The courtesy of the membership of the Aero Club of America has been extended by the Board of Governors for this day to the members of the Society of Automotive Engineers, Automobile Club of America, Automobile Club of New York, Motor Boat Club of America and the New York Yacht Club

Members of the various clubs and their guests will be seated at the same and adjoining tables.

List of speakers and their subjects will be announced later.

The Banquet Committee consists of Benedict Crowell, Chairman; Jas. A Blair, Jr., Howard E Coffin, Maurice Cleary, Cole J. Younger, Augustus Post, Arthur Scholle and Caleb Bragg

Test Flying at Night

Recently Lieut Alexander Pearson, Jr., 12th Squadron (Observation) stationed at Fort Bliss, Texas, took off at 9 30 p m. for a night test flight. He flew a DH4B plane, especially prepared for cross-country trips, having extra gas and oil tanks. Lieutenant Pearson was in the air 45 minutes, and without lights made a perfect landing on the airdrome. He has on previous occasions made cross-country trips at night, finding his way over mountains and prairies and landing on the Fort Bliss airdrome without trouble On one occasion he and Sergeant Jungling were in Prescott, Ariz., doing work in the Grand Canyon, when late one afternoon orders were received to return to Nogales, Ariz., at once The plane was made ready, and the trip was started at 7:30 p m., 225 miles being covered in three hours' flying time and the landing at the airdrome in Nogales being made at 10 30 p m The field at that station is a two-way field and very small. The landing was made without lights

Forest Patrol Operations from March Field

Forest fire patrols from March Field started on August 21, 1921. Two patrols were flown The circle patrol, leaving the field daily, covers 185 miles and takes in San Gabriel Canyon on the Northwest, Baldwin Lake on the east, and San Jacinto Mountains on the southeast The Santa Barbara Patrol, leaving the field one day and returning the next, covers 215 miles one way. Fifty fires have been reported since the patrol started The Air Service report was the first received on twelve of this number. On nine of the fifty the location was 100 per cent efficient, twenty were 80 per cent efficient, and two were missed entirely The accuracy of the remainder cannot be determined, as they were unconfirmed at the time bi-monthly reports were submitted. Ninety-five per cent of the fires were reported within ten minutes of the time of discovery The radio efficiency for the season was 95 per cent i e., the ships were in communication with the ground 95 per cent of their time in the air. The circle patrol was discontinued on October 27, while the Santa Barbara patrol was flown until Nov 15

Japan Sponsors Civilian Flying Instruction

Under regulations of the Japanese War Department, young men between the ages of 17 and 20 years, who are desirous of receiving training with a view to becoming civil aviators, are accepted as pupils by the Chief of the Air Board provided they fulfill certain requirements. The instruction of the air pupils at the Army Flight Schools lasts for eight months

The number of pupils assigned to take the course each year is fixed by the Chief of the Air Board, and vacancies may be filled by him from among those who took the examination for admission and were not previously admitted.

When air pupils have completed their course of study, the Commandant of the Army Flight School awards them certificates of completion and reports the result of their study to the Chief of the Air Board through the Chief of the Army Technical Department.

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